EXHIBIT J

UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF NEW YORK

In Re: Methyl Tertiary Butyl Ether ("MtBE") Products Liability Litigation	MDL No. 1358 Master File C.A. No. 1:00-1898 (SAS)

This document relates to the following cases:

City of New York v. Amerada Hess Corp., et al.

04 Civ. 3417

EXPERT REPORT OF

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MTBE Expert Report

February 2009

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10. MTBE Treatment Costs

10.1. Introduction

MTBE contaminated drinking water supplies must be treated to comply with water quality goals and protect human health. This section discusses the costs of removing MTBE at Station 6 and the Individual Wells.

10.2. Station 6

In 2004, an opinion of capital cost was developed for the Station 6 Demonstration Plant using air stripping (with vapor-phase GAC) for MTBE treatment (Malcolm Pirnie, 2004b). This cost opinion was prepared by a construction cost estimating company, Nasco Construction Services Inc., and was included in the *Station 6 Demonstration Plant Conceptual Design Report* (Malcolm Pirnie, 2004b). In 2005, this estimate underwent a review by another independent construction cost estimating company, Greyhawk, as part of a value engineering review of the project by the City Office of Management and Budget (OMB). In 2009, this cost opinion was updated by Nasco Construction Services Inc. to reflect current pricing, incorporate other value engineering (VE) cost-saving recommendations, and incorporate revised NYCDEP cost estimating guidelines. In addition, an opinion of capital cost was developed for the GAC alternative based on a concept-level design. These cost opinions represent the costs for the Station 6 Demonstration Plant including the entire treatment plant, operational headquarters, and community facilities. These cost estimates were used as the basis of developing opinions of capital costs specific to MTBE treatment and were modified as necessary to reflect changes in MTBE treatment design criteria (e.g., raw water design criteria).

In addition, it should be noted that the air stripping (with vapor-phase GAC) and GAC design concepts are in an early phase of design development, and modifications to the design requirements may be necessary, which may result in increases to the capital and operation and maintenance cost opinions.

Opinions of probable construction cost were developed for both air stripping and GAC for the following scenarios:

- Alternative 1A – Air stripping (with vapor-phase GAC for off-gas treatment) and a finished water treatment goal of <3 µg/L
- Alternative 1B– Air stripping (with vapor-phase GAC for off-gas treatment) and a finished water treatment goal of <1 µg/L
- Alternative 2A – GAC and a finished water treatment goal of <3 µg/L

- Alternative 2B - GAC and a finished water treatment goal of <1 µg/L

For the purposes of these estimates, the cost of MTBE removal was assumed to be the costs of VOC removal in the treatment train. It should be noted that MTBE drives the design of the VOC removal processes. The costs of the other components of the treatment facility are excluded from these estimates. Detailed construction costs estimates for each treatment alternative are included herein.

10.2.1.1. Capital Cost Opinions

The opinions of probable construction cost for MTBE removal were developed in conjunction with Association for the Advancement of Cost Engineering International (AACE) guidelines and NYCDEP's cost estimating procedures and Cost Estimating Manual (NYCDEP, 2008a; NYCDEP; 2008b; NYCDEP, 2007).

The opinions of probable cost for the air stripping alternatives are consistent with an AACE Class 4 Estimate, which are budgetary estimates and are typically considered to be -30% to +50% accurate. This type of cost opinion is appropriate for a project that is between 1% and 15% defined. Consistent with a Class 4 designation, the current opinion of cost is based on a combination of deterministic (i.e., quantity take-offs and unit prices) and stochastic (i.e., factors, allowances, $/sq. ft.) methods.

The cost opinions for the GAC alternatives are consistent with an AACE Class 5 Estimate, which are considered to be concept screening estimates and are typically -50% to +100% accurate. This type of cost opinion is appropriate for a project that is between 0% and 2% defined. It is based on a combination of vendor quotes (obtained for major pieces of equipment) and stochastic (i.e., factors, allowances, $/sq. ft.) methods.

All cost opinions are presented in January 2009 dollars.

There are several 'below-the-line' factors that are added to the cost opinions consistent with standard construction industry and NYCDEP guidelines including bonds and insurance, contractor mobilization and general conditions, contractor home office overhead, contractor profit, design contingency, construction escalation, market condition, change order allowance, and construction contingency. Additionally, factors have been applied to account for costs related to engineering design and design services during construction (DSDC), construction administration (CA) / Resident Engineering (RE), permitting, and legal, financial, and administrative costs. A summary of the percentages for each factor used in the air stripping and GAC alternatives are summarized in **Table 10-1**.

10. MTBE Treatment Costs

10.1. Introduction

MTBE contaminated drinking water supplies must be treated to comply with water quality goals and protect human health. This section discusses the costs of removing MTBE at Station 6 and the Individual Wells.

10.2. Station 6

In 2004, an opinion of capital cost was developed for the Station 6 Demonstration Plant using air stripping (with vapor-phase GAC) for MTBE treatment (Malcolm Pirnie, 2004b). This cost opinion was prepared by a construction cost estimating company, Nasco Construction Services Inc., and was included in the *Station 6 Demonstration Plant Conceptual Design Report* (Malcolm Pirnie, 2004b). In 2005, this estimate underwent a review by another independent construction cost estimating company, Greyhawk, as part of a value engineering review of the project by the City Office of Management and Budget (OMB). In 2009, this cost opinion was updated by Nasco Construction Services Inc. to reflect current pricing, incorporate other value engineering (VE) cost-saving recommendations, and incorporate revised NYCDEP cost estimating guidelines. In addition, an opinion of capital cost was developed for the GAC alternative based on a concept-level design. These cost opinions represent the costs for the Station 6 Demonstration Plant including the entire treatment plant, operational headquarters, and community facilities. These cost estimates were used as the basis of developing opinions of capital costs specific to MTBE treatment and were modified as necessary to reflect changes in MTBE treatment design criteria (e.g., raw water design criteria).

In addition, it should be noted that the air stripping (with vapor-phase GAC) and GAC design concepts are in an early phase of design development, and modifications to the design requirements may be necessary, which may result in increases to the capital and operation and maintenance cost opinions.

Opinions of probable construction cost were developed for both air stripping and GAC for the following scenarios:

- Alternative 1A – Air stripping (with vapor-phase GAC for off-gas treatment) and a finished water treatment goal of <3 µg/L
- Alternative 1B– Air stripping (with vapor-phase GAC for off-gas treatment) and a finished water treatment goal of <1 µg/L
- Alternative 2A – GAC and a finished water treatment goal of <3 µg/L

! Alternative 2B - GAC and a finished water treatment goal of <1 µg/L

For the purposes of these estimates, the cost of MTBE removal was assumed to be the costs of VOC removal in the treatment train. It should be noted that MTBE drives the design of the VOC removal processes. The costs of the other components of the treatment facility are excluded from these estimates. Detailed construction costs estimates for each treatment alternative are included herein.

10.2.1.1. Capital Cost Opinions

The opinions of probable construction cost for MTBE removal were developed in conjunction with Association for the Advancement of Cost Engineering International (AACE) guidelines and NYCDEP's cost estimating procedures and Cost Estimating Manual (NYCDEP, 2008a; NYCDEP; 2008b; NYCDEP, 2007).

The opinions of probable cost for the air stripping alternatives are consistent with an AACE Class 4 Estimate, which are budgetary estimates and are typically considered to be -30% to +50% accurate. This type of cost opinion is appropriate for a project that is between 1% and 15% defined. Consistent with a Class 4 designation, the current opinion of cost is based on a combination of deterministic (i.e., quantity take-offs and unit prices) and stochastic (i.e., factors, allowances, $/sq. ft.) methods.

The cost opinions for the GAC alternatives are consistent with an AACE Class 5 Estimate, which are considered to be concept screening estimates and are typically -50% to +100% accurate. This type of cost opinion is appropriate for a project that is between 0% and 2% defined. It is based on a combination of vendor quotes (obtained for major pieces of equipment) and stochastic (i.e., factors, allowances, $/sq. ft.) methods.

All cost opinions are presented in January 2009 dollars.

There are several 'below-the-line' factors that are added to the cost opinions consistent with standard construction industry and NYCDEP guidelines including bonds and insurance, contractor mobilization and general conditions, contractor home office overhead, contractor profit, design contingency, construction escalation, market condition, change order allowance, and construction contingency. Additionally, factors have been applied to account for costs related to engineering design and design services during construction (DSDC), construction administration (CA) / Resident Engineering (RE), permitting, and legal, financial, and administrative costs. A summary of the percentages for each factor used in the air stripping and GAC alternatives are summarized in Table 10-1.

Table 10-1.
Cost Percentages included in Each VOC Alternative

Cost Item	Air Stripping	GAC
Payment Performance Bonds & Insurance	5%	5%
Contractor Mobilization & General Conditions	12%	12%
Contractor Home Office Overhead	12.5%	12.5%
Contractor Profit	14%	14%
Design Contingency	25%	50%
Escalation[1]	0%	0%
Market Conditions	5%	5%
Change Order Allowance	5%	5%
Construction Contingency	10%	10%
Technical Services including Design, DSDC, CA/RE, and Permitting	25%	25%
Financial, Legal and Administrative Services	5%	5%

[1] Capital cost opinions are presented in 2009 dollars; therefore, no escalation factor was applied to the cost opinions.

The detailed construction costs opinions are located in **Appendix D**. The initial capital costs for the air stripping and GAC alternatives are summarized in **Table 10-2**.

Table 10-2.
Summary of Capital Cost Opinions for Station 6 MTBE Removal

Alternative	Opinions of Probable Construction Cost (2009 dollars)	
	1 - Air Stripping with Vapor-Phase GAC	2- GAC
A - Finished Water Treatment Goal of <3 µg/L	$53,020,000	$60,650,000
B - Finished Water Treatment Goal of <1 µg/L	$69,780,000	$60,650,000

The capital cost opinion for providing MTBE treatment at Station 6 ranges from $53.0 M to $69.8 M (2009 dollars).

10.2.1.2. Operation and Maintenance Cost Opinions

Opinions of annual on-going operation and maintenance costs (O&M) were developed for each alternative and include:

- On-going maintenance and repair of equipment
- Materials and spare parts

- Labor
- Power (i.e., electricity, natural gas) costs
- Sampling costs

O&M activities specific to the air stripping alternative include maintenance of mechanical equipment (materials and labor), monitoring and replacement of vapor-phase GAC, tower cleaning for scale control, and electrical and natural gas costs. O&M activities specific to the GAC alternative include maintenance of equipment (materials and labor), monitoring and change-out of GAC, and electrical costs.

O&M cost opinions were calculated for each alternative based on the projected most probable MTBE concentrations. Additionally, O&M cost opinions were developed for both the average plant flow of 7.5 mgd and the maximum plant flow of 10 mgd.

O&M cost opinions for the GAC and air stripping alternatives over a 40-year life cycle range from $40.3 M to $163.5 M (2009 dollars), as shown in **Table 10-3**. Based on the anticipated MTBE concentration trends, air stripping O&M cost opinions range from $40.3 M to $58.6 M while GAC O&M cost opinions range from $120.3 M to $163.5 M (2009 dollars). Refer to **Appendix D** for the detailed O&M cost opinions.

10.2.1.3. Life Cycle Cost Opinions

The net present value of each MTBE removal alternative was calculated using the initial capital cost and forty years of annual operation and maintenance cost opinions. The life cycle costs were defined to include up-front capital costs, on-going annual operations and maintenance costs and recurring capital costs. Operation and maintenance cost opinions were calculated based on the anticipated trend of MTBE during the 40-year time frame (as shown in **Figure 9-2**).

Annual operation and maintenance costs were estimated based on the most probable MTBE concentrations and are presented in **Table 10-3**. Operation and maintenance cost opinions were estimated in 2009 dollars and escalated in future years in accordance with common cost escalation factors. Inflation factors used in this analysis included:

- Operation and Maintenance Costs
- Electrical Costs
- Natural Gas
- Labor Costs

For the air stripping design, a recurring capital cost every 20 years for replacement of various parts of the system has been included in the analysis. Replacement parts include blowers, heaters, heat exchangers, air filters, silencers, ductwork and packing material. For the GAC design, a recurring capital cost every 20 years has been included for

rehabilitation work needed on the GAC system (i.e., replacement of valves, instrumentation, etc.). Salvage value was not included in this analysis. Replacement costs for the GAC and air stripping alternatives were included in year 20 and year 40 of the analysis.

Life cycle cost opinions were discounted using the Department of the Interior's current discount factor of 4.625% (NRCS, 2009). An inflation factor of 3% for operation and maintenance cost opinions and an inflation factor of 3% for future construction cost opinions were used in this analysis based on ENR historical cost indices (ENR, 2009). All net present values are presented in 2009 dollars.

The life cycle cost opinions associated with the MTBE treatment alternatives are summarized in **Table 10-3.**

Table 10-3.
Life Cycle Cost Opinions for MTBE Treatment

Net Present Value (2009 dollars)					
Alternative	Flow	Capital Cost Opinion		O&M Cost Opinion (40 Years)	Total Net Present Value
		Initial Capital	Equipment Replacement		
1A	7.5 mgd	$53,020,000	$30,170,000	$40,300,000	$123,490,000
	10 mgd	$53,020,000	$30,170,000	$41,580,000	$124,760,000
1B	7.5 mgd	$69,780,000	$40,330,000	$55,820,000	$165,930,000
	10 mgd	$69,780,000	$40,330,000	$58,590,000	$168,700,000
2A	7.5 mgd	$60,650,000	$53,680,000	$120,340,000	$234,680,000
	10 mgd	$60,650,000	$53,680,000	$149,010,000	$263,340,000
2B	7.5 mgd	$60,650,000	$53,680,000	$131,410,000	$245,740,000
	10 mgd	$60,650,000	$53,680,000	$163,460,000	$277,790,000

Life cycle cost opinions for MTBE treatment alternatives at Station 6 range from $123.5M to $277.8M (2009 dollars).

10.2.1.4. Station 6 Summary

Based on the anticipated MTBE concentration trends at Station 6 (as predicted by LBG), air stripping would be recommended for application at Station 6 which has a capital cost range of $53.0M to $69.8M (2009 dollars) and a life cycle cost range of $123.5M to $168.7M (2009 dollars).

10.3. Costs to Remove MTBE at the Individual Wells

As discussed in **Section 9**, air stripping (with vapor-phase GAC for off-gas treatment) and liquid phase GAC are both technically feasible alternatives for treatment of MTBE at the Individual Wells. Opinions of capital costs and O&M costs for providing MTBE treatment at these wells are discussed below.

10.3.1. Opinions of Capital Cost

Opinions of capital cost estimates were developed using the Station 6 capital cost opinions as a basis. All opinions of capital cost for the Individual Wells are consistent with an AACE Class 5 Estimate, which are considered to be concept screening estimates and are typically -50% to +100% accurate. Similar to the Station 6 capital cost opinions, several 'below-the-line' factors were added to each alternative and are summarized in **Table 10-4**. All capital cost opinions are presented in 2009 dollars. As discussed in **Section 9**, onsite and offsite treatment was analyzed for the Individual Wells. Offsite treatment costs were calculated using dollar per mgd costs based on the Station 6 cost opinions.

Table 10-4.
Cost Percentages included in Each Opinion of Capital Costs

Cost Item	Percentage
Payment Performance Bonds & Insurance	5%
Contractor Mobilization & General Conditions	12%
Contractor Home Office Overhead	12.5%
Contractor Profit	14%
Design Contingency	50%
Escalation[1]	0%
Market Conditions	5%
Change Order Allowance	5%
Construction Contingency	10%
Technical Services including Design, DSDC, CA/RE, and Permitting	25%
Financial, Legal and Administrative Services	5%

[1] Capital cost opinions are presented in 2009 dollars; therefore, no escalation factor was applied to the cost opinions.

The detailed construction costs opinions are located in **Appendix D**. The opinions of capital cost for the Individual Wells are summarized below.

10.3.1.1. Well 5

Opinions of capital cost for Well 5 are summarized in **Table 10-5**.

Table 10-5.
Well 5 Opinions of Capital Costs

Alternative	Opinions of Probable Construction Cost (2009)	
	Air Stripping with Vapor-Phase GAC	GAC
On-Site Treatment		
Finished Water Goal <3 ug/L	$19,260,000	$9,930,000
Finished Water Goal <1 ug/L	$29,900,000	$9,930,000
Off-Site Treatment		
Finished Water Goal <3 ug/L	$11,030,000	$10,510,000
Finished Water Goal <1 ug/L	$14,520,000	$10,510,000

10.3.1.2. Well 22

Opinions of capital cost for Well 22 are summarized in **Table 10-6.**

Table 10-6.
Well 22 Opinions of Capital Cost

Alternative	Opinions of Probable Construction Cost (2009)	
	Air Stripping with Vapor-Phase GAC	GAC
On-Site Treatment		
Finished Water Goal <3 ug/L	$17,850,000	$9,930,000
Finished Water Goal <1 ug/L	$19,480,000	$9,930,000
Off-Site Treatment		
Finished Water Goal <3 ug/L	$9,350,000	$8,920,000
Finished Water Goal <1 ug/L	$12,320,000	$8,920,000

10.3.1.3. Well 26

Opinions of capital cost for Well 26 are summarized in **Table 10-7.**

Table 10-7.
Well 26 Opinions of Capital Cost

Alternative	Opinions of Probable Construction Cost (2009	
	Air Stripping with Vapor-Phase GAC	GAC
On-Site Treatment		
Finished Water Goal <3 ug/L	Not Applicable[1]	$9,930,000
Finished Water Goal <1 ug/L	Not Applicable[1]	$9,930,000
Off-Site Treatment		
Finished Water Goal <3 ug/L	$9,150,000	$8,780,000
Finished Water Goal <1 ug/L	$12,080,000	$8,780,000

[1] No raw water design criteria were available for Well 26; therefore, only capital cost opinions for on-site treatment were developed for the GAC alternative (due to ability to treat a range of influent concentrations).

10.3.1.4. Well 39

Opinions of capital cost for Well 39 are summarized in **Table 10-8.**

Table 10-8.
Well 39 Opinions of Capital Cost

Alternative	Opinions of Probable Construction Cost (2009)	
	Air Stripping with Vapor-Phase GAC	GAC
Off-Site Treatment[1]		
Finished Water Goal <3 ug/L	$12,820,000	$12,280,000
Finished Water Goal <1 ug/L	$16,900,000	$12,280,000

[1] No onsite treatmant cost opinions due to site constraints.

10.3.1.5. Well 45

Opinions of capital cost for Well 45 are summarized in **Table 10-9.**

Table 10-9.
Well 45 Opinions of Capital Cost

Alternative	Opinions of Probable Construction Cost (2009)	
	Air Stripping with Vapor-Phase GAC	GAC
Off-Site Treatment[1]		
Finished Water Goal <3 ug/L	$9,610,000	$9,150,000
Finished Water Goal <1 ug/L	$12,660,000	$9,150,000

[1] No onsite treatment cost opinions due to site constraints.

10.3.2. O&M Cost Opinions

Similar to the Station 6 analysis, opinions of O&M costs were developed for each of the Individual Wells. O&M costs developed for the on-site treatment option were developed in accordance with the methodology presented for Station 6. Dollar per mgd costs were developed (based on the Station 6 costs) and used to calculate O&M cost opinions of the off-site treatment options.

10.3.2.1. Well 5

Operation and maintenance costs for the alternatives listed above were developed for specific MTBE influent concentrations. **Figure 10-1** shows O&M cost opinions associated with specific MTBE influent concentrations for providing onsite treatment. **Figure 10-2** shows O&M cost opinions associated with specific influent MTBE concentrations for providing offsite treatment. It is anticipated that offsite treatment would provide blending of the Well 5 water; therefore, concentrations would likely be lower than providing onsite wellhead treatment.

Figure 10-1: Well 5 On-site Annual O&M Costs

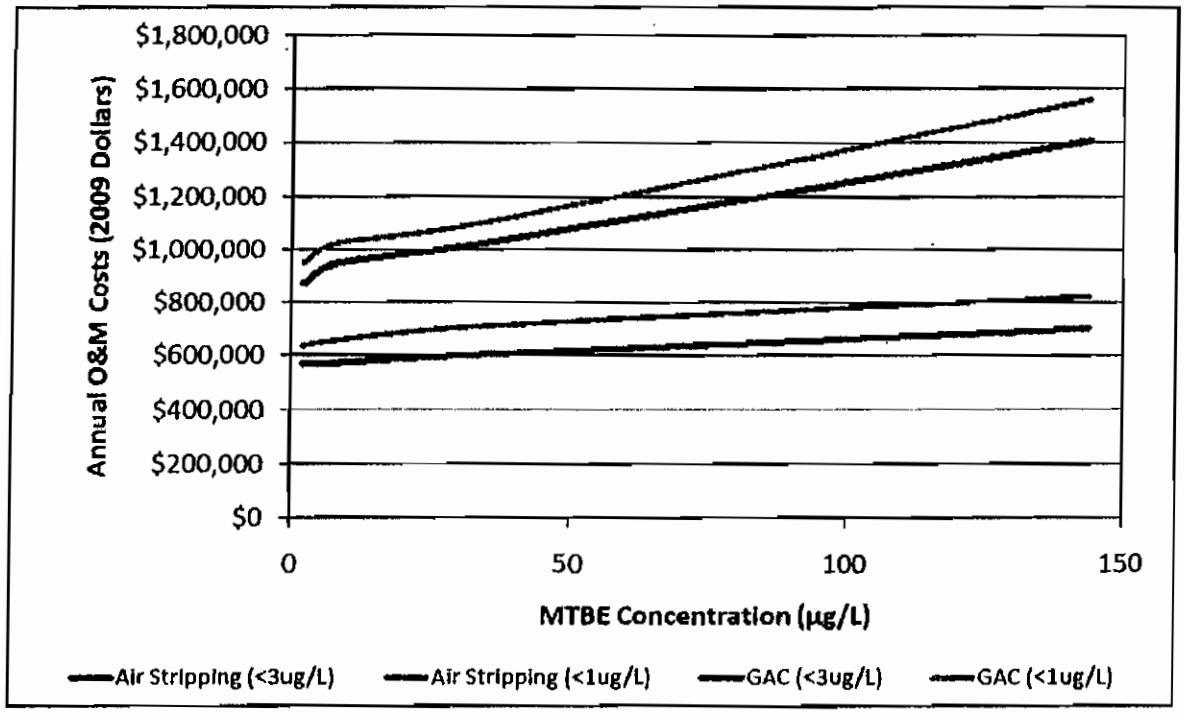
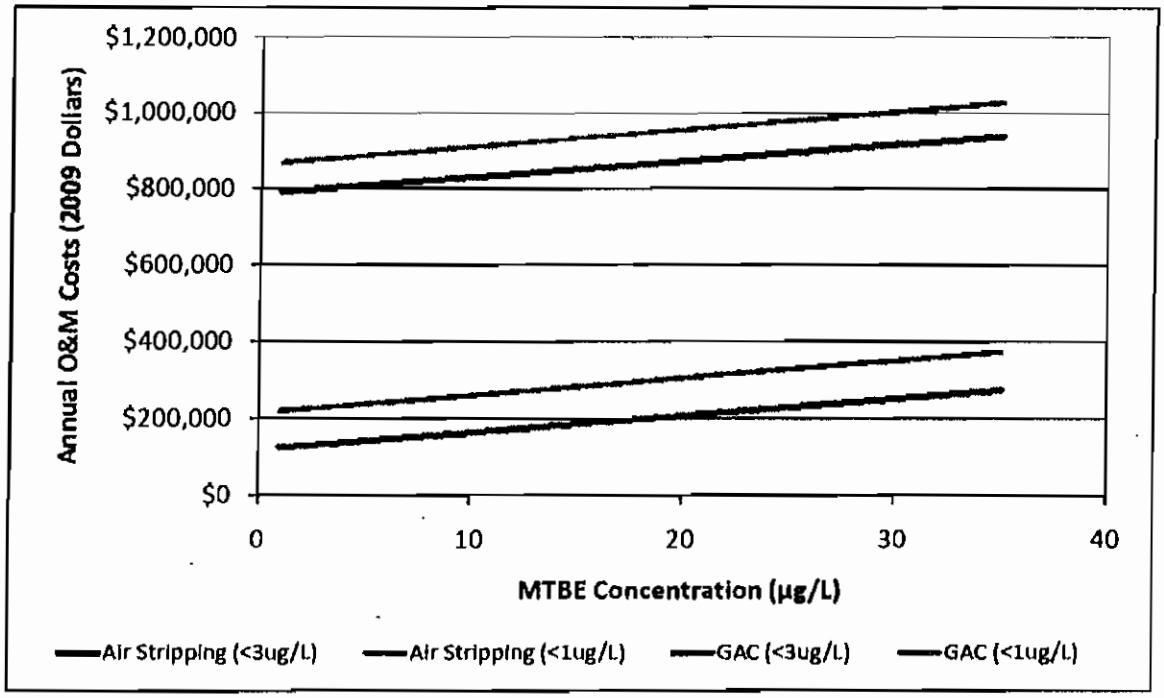


Figure 10-2: Well 5 Off-site Annual O&M Costs



10.3.2.2. Well 22

Operation and maintenance costs for the alternatives listed above were developed for specific MTBE influent concentrations. **Figure** 10-3 shows O&M cost opinions associated with specific MTBE influent concentrations for providing onsite treatment. **Figure 10-4** shows O&M cost opinions associated with specific influent MTBE concentrations for providing offsite treatment. It is anticipated that offsite treatment would provide blending of the Well 22 water; therefore, concentrations would likely be lower than providing onsite wellhead treatment.

Figure 10-3: Well 22 On-site Annual O&M Costs

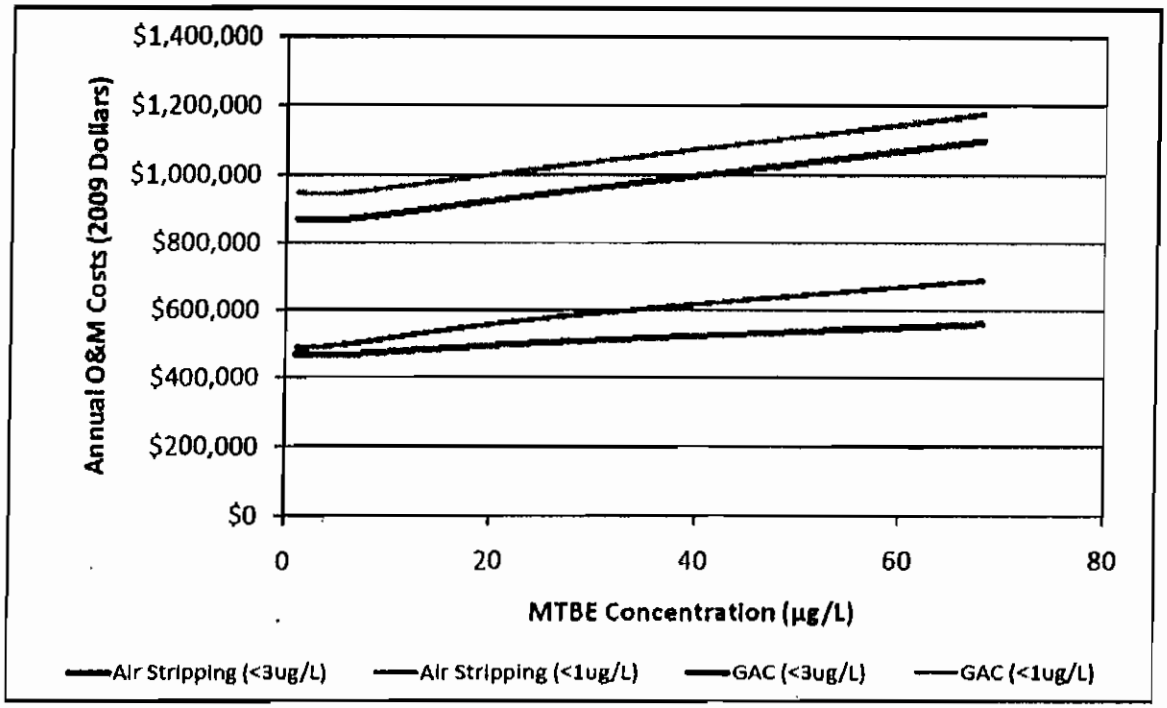
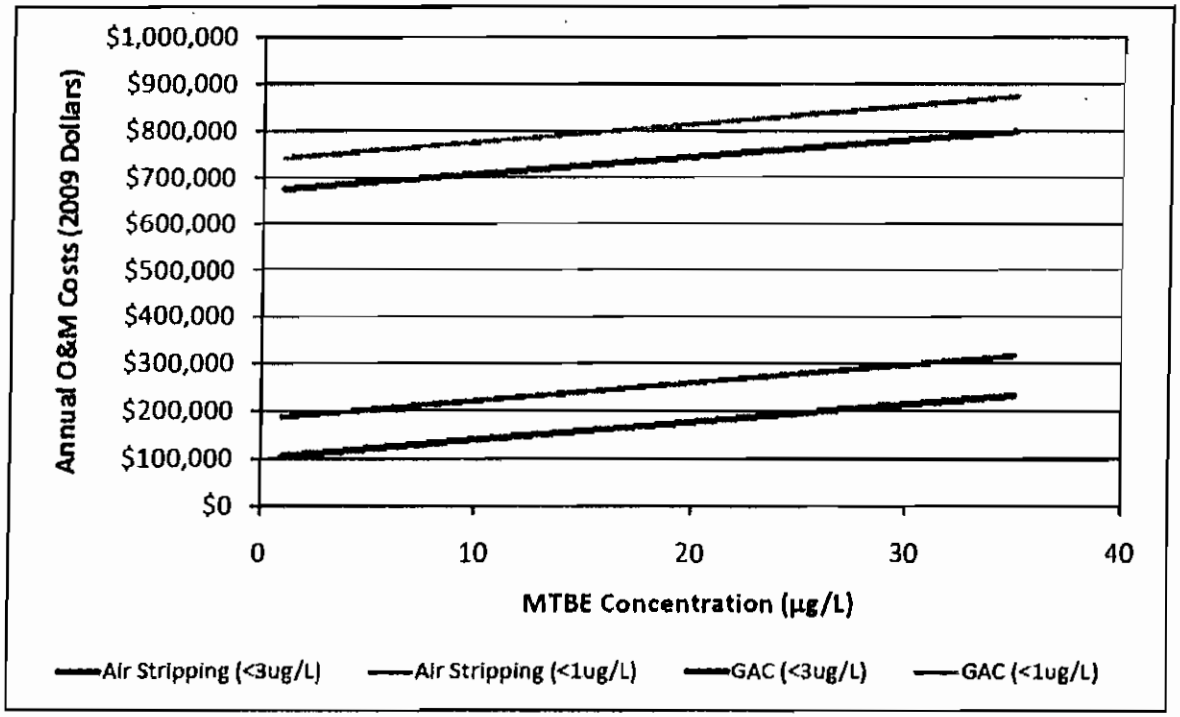


Figure 10-4: Well 22 Off-site Annual O&M Costs



10.3.2.3. Well 26

The sources for Well No. 26 remain unknown; therefore, no contaminant modeling was performed by LBG. Although the future trends of MTBE are unknown; MTBE is currently present in the wells and could continue to impact the well in the future. O&M costs for this well will vary with the influent MTBE concentrations. **Figure 10-5** shows O&M costs for a range of MTBE influent concentrations providing on-site treatment of MTBE at Well 26 and **Figure** 10-6 shows O&M costs for off-site treatment of MTBE.

Figure 10-5: Well 26 On-site Annual O&M Costs

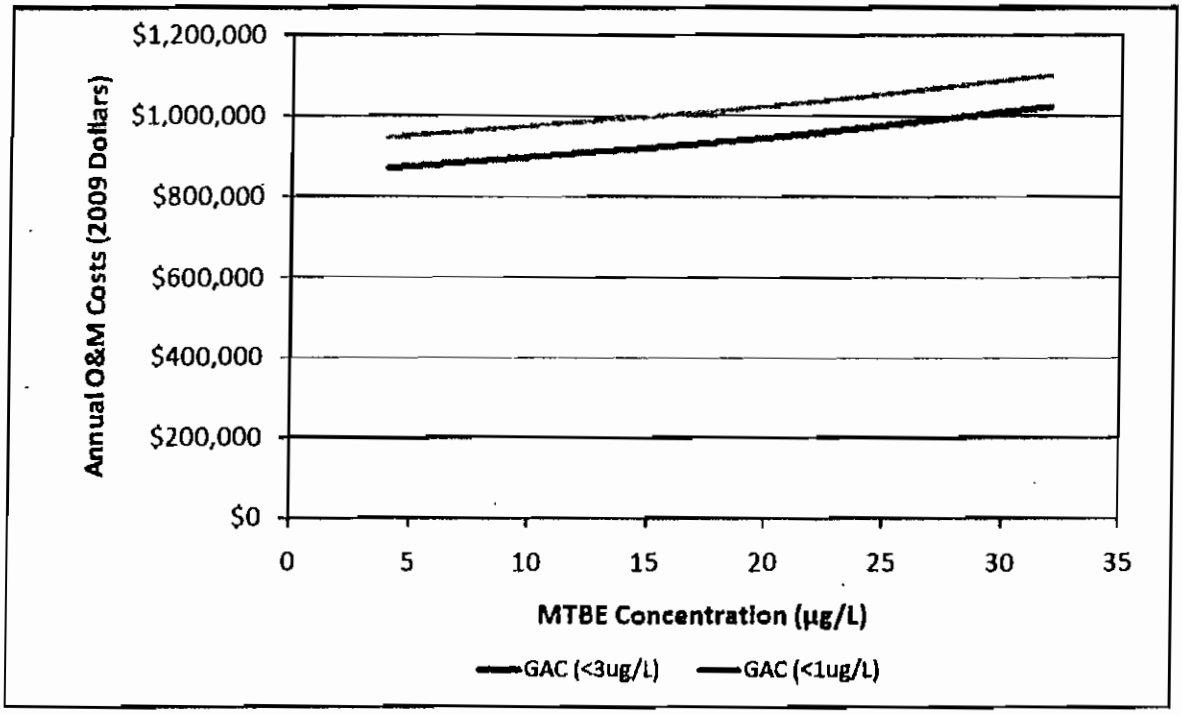
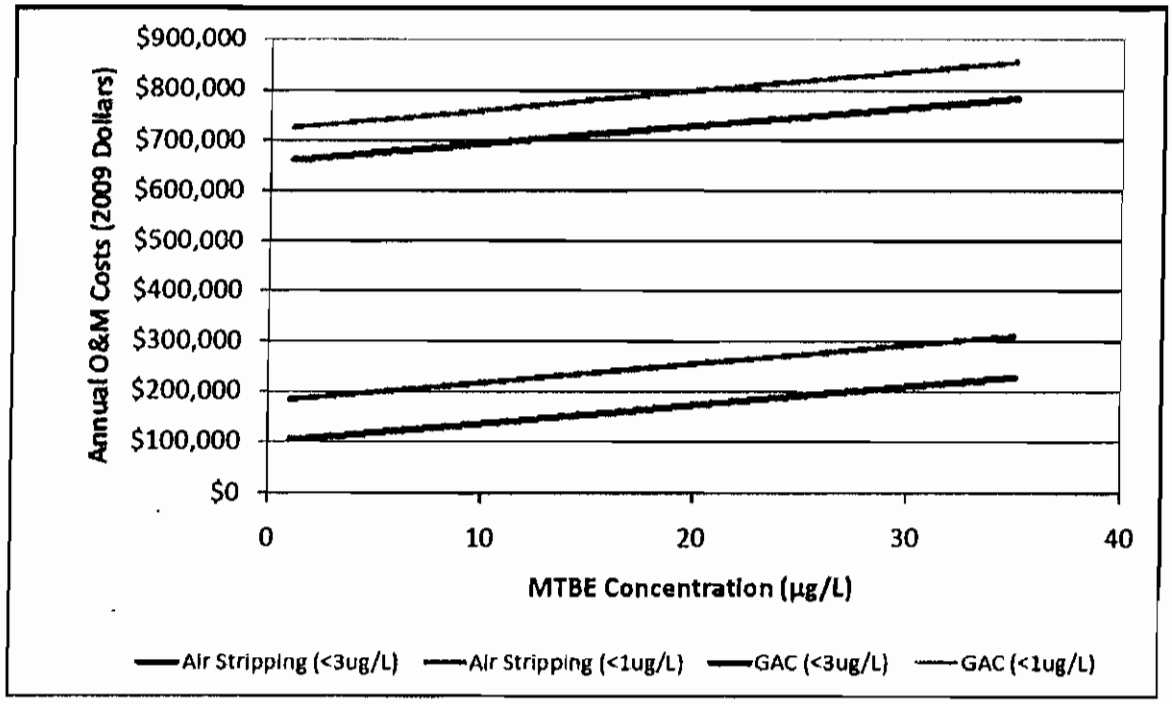


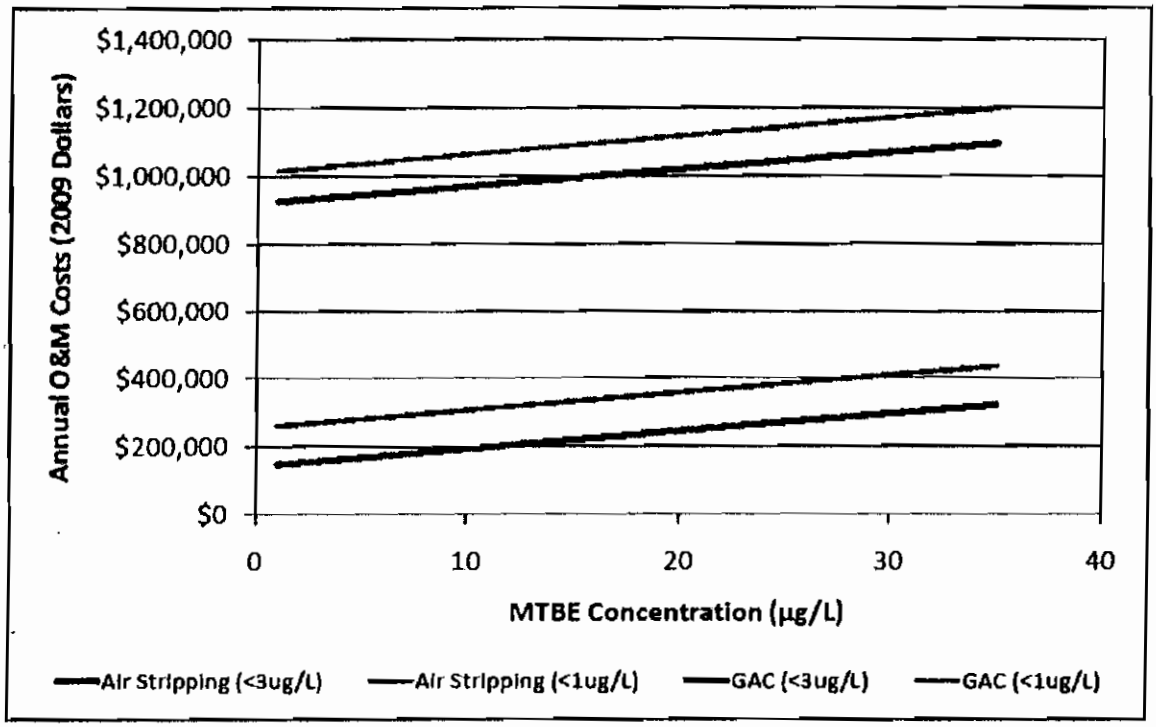
Figure 10-6: Well 26 Off-site Annual O&M Costs



10.3.2.4. Well 39

Operation and maintenance costs for the alternatives listed above were developed for specific MTBE influent concentrations. **Figure** 10-7 shows O&M cost opinions associated with specific MTBE influent concentrations for providing off-site treatment. It is anticipated that offsite treatment would provide blending of the Well 39 water; therefore, concentrations would likely be lower than providing onsite wellhead treatment.

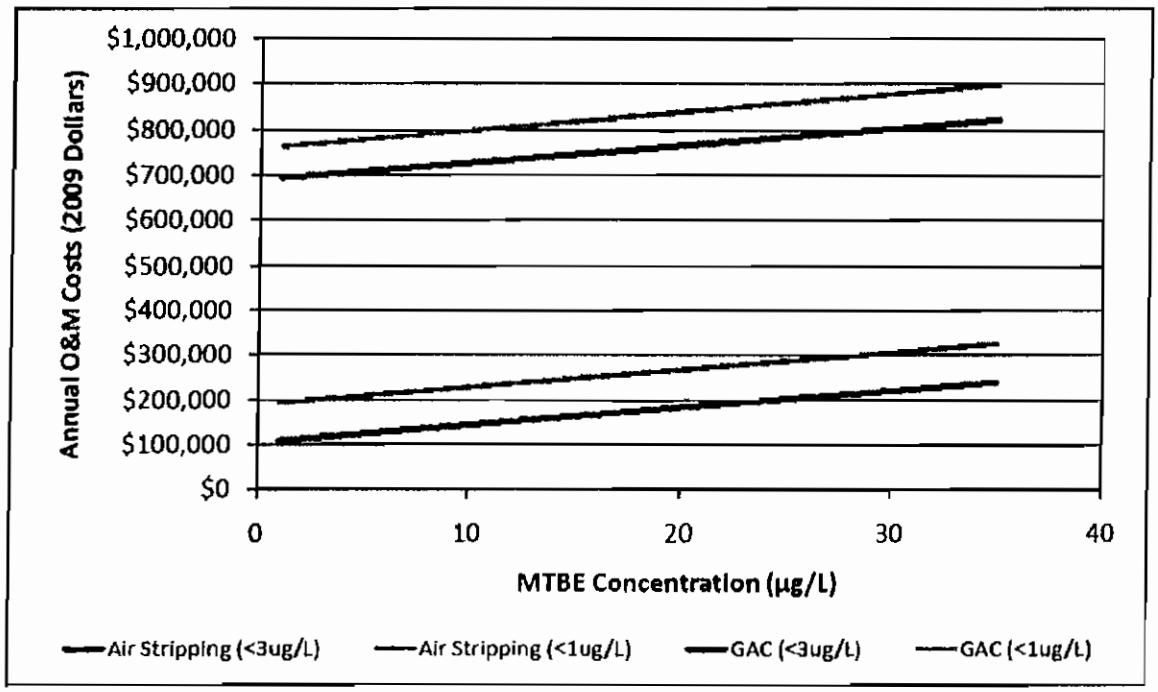
Figure 10-7: Well 39 Off-Site Annual O&M Costs



10.3.2.5. Well 45

Operation and maintenance costs for the alternatives listed above were developed for specific MTBE influent concentrations. **Figure** 10-8 shows O&M cost opinions associated with specific MTBE influent concentrations for providing off-site treatment. It is anticipated that offsite treatment would provide blending of the Well 45 water; therefore, concentrations would likely be lower than providing onsite wellhead treatment.

Figure 10-8: Well 45 Off-Site Annual O&M Costs



10.3.3. Individual Well Summary

Opinions of capital costs for the Individual Wells vary depending on the influent MTBE concentration. Refer to **Figures 10-1** through **10-8** for annual O&M costs associated with Individual Wells for the different treatment alternatives.